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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/536,576

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Piotr Szwaykowski

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EXAMINER

LEE, HWA S

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/536,576	<b>Applicant(s)</b> SZWAYKOWSKI ET AL.	
	<b>Examiner</b> Hwa S. Lee (Andrew)	<b>Art Unit</b> 2886	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 12/8/09.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 3-39 is/are pending in the application.
- 4a) Of the above claim(s) 36-39 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Newly submitted claims 36-39 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: claims 36-38 do not require the beams to follow a substantially common path through said interferometric system and claim 39 requires a tip-tilt mechanism not required of claims 1-26 and are thus distinct claimed species.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 36-39 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-11, 13, 14, 16-21, and 26-33, are rejected under 35 U.S.C. 102(b) as being anticipated by Kuchel (US 4,872,755).

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Kuchel show an interferometer for measuring optical phase differences (e.g. Figure 6) comprising

a source module (60) configured to generate mutually orthogonally polarized beams of light from spatially separated sources;

an interferometry module (13-16) receiving said mutually orthogonally polarized beams from said source module, and having at least a reference object (14) and a test object (16) for interaction with said beams; and

a simultaneous phase shifting module (68) receiving a portion of said beams from said interferometry module for generating at least two phase-shifted (67b) interferograms substantially simultaneously from said beams.

wherein said beams follow a substantially common path through said interferometric system.

With respect to claims 3 and 4, see polarizing beamsplitter (60a) that produces the orthogonal test and reference beams that are spatially separated.

With respect to claim 5, the reference and test beams received by said simultaneous phase shifting module substantially overlap each other.

With respect to claim 6, the laser (11) produces the mutually orthogonally polarized beams that are coherent.

With respect to claim 7, the beamsplitter (60a) splits the beam from laser (11) to produce two spatially separated sources.

With respect to claims 8 and 18, beamsplitter 12d is an alignment module positioned to intercept the beams between the interferometry module and the simultaneous phase-shifting

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module.

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With respect to claim 9, 17b, 67a, and 18a-d are imaging modules.

With respect to claims 10, 20, and 21, the source module includes a linearly polarized light source (11) and a polarization beamsplitter (60a) configured to split linearly polarized light into said two mutually orthogonally polarized beams, wherein said polarization beamsplitter comprises a prism.

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With respect to claim 11, the sources are virtual.

With respect to claims 13 and 14, the interferometry module further includes a nonpolarizing beamsplitter (12d) wherein the nonpolarizing beamsplitter is positioned substantially between the source module (60) and the reference object (14).

16. An interferometric system of claim 15, wherein the quarter waveplate is positioned substantially between the nonpolarizing beamsplitter and a collimator.

With respect to claim 17, the interferometry module is of a Fizeau configuration.

With respect to claim 19, Kuchel shows an imaging module (17b, 67a) is positioned to intercept the beams between the interferometry module and the simultaneous phase shifting module.

With respect to claims 27 and 28, Kuchel shows an aperture filter (17a) to block said other portion of the beams from entering the simultaneous phase shifting module.

With respect to claim 29, Kuchel shows:

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a source module (60) having a source (11) of polarized light and a polarization beamsplitter (60a) configured to act on said polarized light to generate mutually orthogonally polarized beams of light;

an interferometry module (13-16) receiving said orthogonally polarized beams from said source, having optical elements (12d, 13), a reference object (14) and a test object (16), said interferometry module further comprising means for overlapping (13) a test beam and a reference beam;

a phase shifting module (68) receiving a portion of said beams from said interferometry module to generate at least two phase-shifted (67b) interferograms substantially simultaneously from said test and reference beams, wherein said beams follow a substantially common path through said interferometric system.

With respect to claim 30, the polarized light from said source module is linearly polarized.

With respect to claim 31, elements (18a-d) are means for viewing said test and reference beams.

With respect to claim 32, polarizing beamsplitter (68b or 68c) is a means for selecting said test and reference beams.

With respect to claim 33, Kuchel shows:

a source module (60) having a source (11) of linearly polarized light, and a polarization beamsplitter (60a) configured to generate mutually orthogonally polarized wavefronts as emanating from two spatially separated sources;

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an interferometry module (12b-16) receiving said orthogonally polarized wavefronts, said interferometry module having a test object (16) and a reference (14), a beam splitter (12d) and a collimator (13), wherein orthogonally polarized reference wavefronts and orthogonally polarized test wavefronts exit the interferometry module; means for overlapping (17) one of said orthogonally polarized reference wavefront with one of said orthogonally polarized test wavefronts;

a simultaneous phase shifting module (68) receiving said overlapping one reference wavefront and said one test wavefront from said interferometry module for generating at least two phase-shifted (67b) interferograms substantially simultaneously, wherein said wavefronts follow a substantially common path through said interferometric system.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 12, 15, 22-25, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kuchel as applied to their respective independent claim or as applied to claims 1 and 33 above.

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With respect to claim 12, Kuchel does not show the sources being real, however it is well known in the art that there are several ways to make orthogonally polarized beams, including the use of two separate real sources. At the time of the invention, one of ordinary skill in the art would have used two real sources in order to produce beams of high intensity. By using two real sources, the beams have more intensity than the use of a single source where the beam is split in intensity to produce the two beams.

With respect to claims 15 and 34, Kuchel shows the quarter wave plate located in the source, and not positioned between the source module and the reference object, however the relocation of a working part only requires routine skill in the art.

With respect to claims 22-25, Official Notice is taken that the different forms of polarizing beamsplitters are well known in the art and are functional equivalents. At the time of the invention, a skilled artisan would have used calcite for its quality optical properties, would have used a cube splitter for low cost, and would have used optical fibers for flexibility.

### ***Response to Arguments***

5. Applicant argues that Kuchel does not show the beams follow a substantially common path through the interferometric system. The Examiner respectfully disagrees. In Figure 1, the beams follow a common path for the entire interferometer system except for the portion split by beamsplitter 10a and the rejoined by the same beamsplitter 10a and in the gap 15. These



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portions are small compared to the portions where the beams follow a common path. The beams share a common path from the light source 11 to the beamsplitter 10a, and also share a common path from the beamsplitter 10 to beamsplitter 12d, then to planar plate 14, then back to beamsplitter 12d, where the beams continue through to receiver 18. Thus the Examiner submits that the beams follow a substantially common path through the interferometric system.

6. Applicant argues that it is improper to combine reference where the references teach away from their combination. The Examiner submits that the rejection did not rely on combining references and submits that Kuchel does not absolutely teach away from placing the quarter wave plate between the reference object and the test object. Kuchel only states that the quality of the quarterwave plate needs to be of high quality in order to be placed between the reference object and the test object. Thus with the availability of a high quality quarterwave plate, it would be a mere matter of relocation of essential working parts. Furthermore, a skilled artisan would recognize that minimizing the pathlength which the beams are orthogonally polarized would improve the quality of the beams since both the reference beam and the object beam would be identical (i.e. both would be a single common beam) all the way up to the point of being separated by being orthogonally polarized. This lessens the amount with which the two beams can be adversely affected by birefringent effects of the optical elements and air. In other words, optical elements can adversely affect one polarization more than another. Thus minimizing the length with which the beams are separately polarized, would reduce the adverse polarization affects. Please see US 5,995,223, Figure 5 and US 4,732,483 which anticipate claim 34 and also show the quarterwave plate between the reference object and the test object.

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***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hwa S. Lee (Andrew) whose telephone number is 571-272-2419. The examiner can normally be reached on Monday, Tuesday, Thursday, and Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur R. Chowdhury can be reached on 571-272-2800. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hwa S. Lee (Andrew)/  
Primary Examiner, Art Unit 2886